

REMARKS

This amendment is being filed with a Request for Continued Examination. In the final Office Action dated January 10, 2007, the Examiner rejected claims 1-6 and 8-16 under 35 U.S.C. § 112, first paragraph as being non-enabling. Claim 17 was rejected under 35 U.S.C. § 112, second paragraph as being indefinite. Claims 1, 8, 10, 13, 14 and 17-21 were rejected under §102(b) or alternatively under § 103(a) as being unpatentable over United States Patent No. 5,631,317 to *Komatsu*. The Examiner rejected claims 2-6, 9, 11, 12, 15, and 16 under § 103(a) as obvious over the '317 *Komatsu* patent in view of United States Patent No. 5,976,694 to *Tsai*.

Applicant gratefully acknowledges the interview granted by the Examiner on February 6, 2007. Per our discussions in that interview, the claims have been amended to more specifically describe that the features of the latex binder composition include an emulsion polymerized polymer and a colloid component. To this end, independent claims 1, 14, 15, and 17 have been canceled and new claims 22-25 have been added. Additionally, the remaining claims have been amended to ultimately depend from one of the newly added independent claims. No new matter has been added by amendment. New claim 22 is supported by original claim 1, and new claim 23 is supported by original claims 1, 18, and 20. Additionally, both new claim 22 and 23 find support in the application as originally filed at page 4, lines 16-17; page 6, lines 3-5; and page 6, lines 16-22. New claim 24 is supported in the application as originally filed at page 6, lines 11-13. New claim 25 is supported in the application 8, lines 5-6; and page 3, lines 7-8.

The new claims added by the above amendments unambiguously recite that the latex binder includes a polymer component that is emulsion polymerized in the presence of a polymeric colloid component which acts as a stabilizer during polymerization of the polymer. Thus the latex binder used in the non-woven material includes both a main polymer component and a polymeric colloid component. The colloid component may be produced separately or *in situ*, and may also be produced using emulsion polymerization techniques, if desired. See, pending application at p. 6, lines 18-19. New claim 23 is reproduced below for convenience.

New Claim 23. A non-woven material comprising:  
a) a web of fibers; and

b) a latex polymer binder applied to the web of fibers, wherein said latex polymer binder has a glass transition temperature of from -40°C to 105°C and comprises:

i) a polymer component which includes at least one hydrophilic monomer selected from the group consisting of acidic monomers containing a carboxylic acid moiety, dicarboxylic acid moiety, a sulfonic acid moiety, or combinations thereof; and at least one non-hydrophilic monomer selected from the group consisting of (meth) acrylates, maleates, (meth) acrylamides, vinyl esters, and combinations thereof,

and

ii) a polymeric colloid component,

wherein said polymer component is emulsion polymerized using said colloid component as a stabilizer, and

wherein said latex polymer composition forms films that are dispersible in tap water, and non-dispersible in aqueous solutions containing 0.5 weight percent or more of an inorganic salt.

As amended, all claims are believed to be clearly distinguishable over the art of record; the distinctions between the prior art and the pending invention are believed particularly apparent with reference to the § 1.132 *Declaration of Steven P. Pauls Sr.*, which accompanies this submission. The rejections should be withdrawn for the reasons enumerated herein.

Turning first to the rejections over prior art, the Examiner rejected the claims as either obvious or anticipated over the '317 *Komatsu* reference either alone or in view of the '694 *Tsai* patent. The '317 *Komatsu* reference discloses salt-sensitive polymers which are solution polymerized in the presence of organic solvent. As stated in *Komatsu* at column 2 describing the method of polymerization:

The present invention has been completed on the basis of a finding that the above-described problem can be solved by copolymerizing acrylic acid and two or more specified (meth)acrylic esters as the monomers in a specified ratio  
 35 while the total amount of the monomers is kept above a specified concentration in a mixed solution of a specified organic solvent and water, then neutralizing a specified rate of the acrylic acid moiety, distilling off the organic solvent used for the polymerization, and adding water to obtain the  
 40 resultant polymer in the aqueous medium.

The solution polymerization techniques used in *Komatsu* are also apparent from the examples, where the monomer components are dissolved in a mixture of acetone and water (no stabilizing agents or colloids are added) and the polymerization is initiated and occurs while dissolved in the solution.

[0027] The process for producing salt sensitive emulsions of the invention involves the formation of a colloid stabilizer, followed by an emulsion polymerization using said stabilizer by means known in the art. The stabilizer may either be formed in situ, or added separately. A useful process for producing the salt sensitive emulsions is found in U.S. patent application Ser. No. 09/540,033, incorporated

herein by reference. The emulsion polymerization may be a batch, semi-batch, or continuous process.

The above points are underscored by the attached *Declaration of Steven P. Pauls*, where he states that the *Komatsu et al.* reference uses solution polymerization techniques, which are fundamentally different from the emulsion polymerization techniques that are used to fabricate the latex binders of the present invention. Specifically, the *Komatsu et al.* reference uses a single-phase polymerization process where the monomer components are polymerized in an acetone solvent medium. The resulting polymer is dissolved in the reaction medium. *See, Declaration* at paragraphs. 6-7.

In contrast to the polymerization procedures described in *Komatsu*, the latex polymers of the claimed invention are emulsion polymerized, whereby a stabilizing agent is dispersed in water to form a plurality of nanometer-sized micelles which encapsulate the monomers and create a dispersed phase where the polymerization proceeds. *See, Declaration* at paragraph 5. Emulsion polymerization techniques enable the production of high solids compositions, and do not require the use of environmentally harmful solvents. Emulsion polymers, such as those used in the invention, are not remotely suggested by references such as *Komatsu* which use solution polymers.

Applicant also notes that the emulsion polymerization processes used to make the latex binder of the invention impart critical structure and attributes to the polymer, and ultimately to

the non-woven web, which are important in salt-sensitive binder applications, and readily distinguish it from similar resins which are solution polymerized. The distinction is noted in the pending application at page 4, lines 3-15:

While not being bound to a theory, it is believed that the dispersion of the polymer film is related to the fact that a film forms from an emulsion by coalescence of polymer particles, forming weak bonds between particles. In water, some bonds between the particles will break, resulting in clusters of polymer particles. This is different from a solution polymer in which polymer chains mix and entangle during film formation, and this film dissolves into individual polymer chains, which cannot be filtered. Since the polymer contains a high level of hydrophilic monomer(s), when the emulsion dries to a film, the particles are easily dispersed in water. Salt-sensitive

As further stated in the *Declaration* at paragraph 8, the emulsion structure of the latex polymer enables the resin to quickly disperse in water, even when using relatively less hydrophilic monomers such as methacrylic acid. *Declaration* at paragraph 8. Contrariwise, film formation of solution polymers form strong bonds that are not typically readily dispersible unless the polymer is substantially water soluble to begin with. In this respect, the polymers of *Komatsu* require large amounts of extremely hydrophilic monomers such as acrylic acid to maintain water dispersibility.

Finally on this issue, as pointed out by the Examiner in the interview, the *Komatsu* reference teaches that the organic solvent used to polymerize the resin is distilled off, and water added, to leave the polymer component dispersed in the water portion in an "emulsion" form. See, '317 *Komatsu* at col. 5, lines 25-40, reproduced below:

After the completion of the reaction, the organic solvent is mainly distilled off, while water is kept in the reaction solvent as far as possible. Therefore, the distillation is preferably conducted at a temperature ranging from the boiling point of the organic solvent to 140° C., such as 70° to 140° C., preferably 70° to 100° C. under a pressure ranging from reduced pressure of 20 mmHg to atmospheric pressure. Water is added when the amount of the organic solvent in the mixed solvent has been reduced to 5% or less, preferably 1% or less. Although the amount of water to be added is not particularly limited, it is preferably such that the water content of the reaction system is 100 to 900 parts by weight, more preferably 150 to 500 parts by weight, for 100 parts by weight of the polymer. In the presence of such an amount of water, the polymer easily self-disperses in water to form an emulsion.

*See, also*, col. 6, lines 19-31. However, although *Komatsu* refers to this composition as an “emulsion,” it is not emulsion polymerized as recited in the pending claims, nor is it stabilized by polymeric colloids or any other stabilizing agents. *See, also, Declaration* at paragraph 7. The rejections over the *Komatsu* reference should accordingly be withdrawn.

Turning to the § 112 rejections, the Examiner rejected claims 1-6 and 8-16 as failing to meet the enablement requirement, arguing primarily that the specification does not enable a person of ordinary skill in the art to produce a polymer with a glass transition temperature (“Tg”) of -40°C to 105°C. *See*, January 10, 2007 Final Rejection at Section 3.

The enablement rejection should likewise be withdrawn because the production of a latex polymer with the claimed Tg values would be well within the knowledge of a person ordinarily skilled in the art. As noted in the attached *Declaration* at paragraph 10, the glass transition temperature of a polymer generally can be predicted based on the composition of the monomers, *i.e.*, by incorporating “hard” or “soft” monomers to influence the glass transition temperature of the final product. **Exhibit A** accompanying the *Declaration* explains this relationship in greater detail:

The glass transition temperature of most copolymers can be accurately calculated with the nonlinear equation of GORDON and TAYLOR [107] given below. Other nonlinear equations are discussed elsewhere [108].

$$T_g = \frac{T_{gA}w_A + cT_{gB}w_B}{w_A + cw_B}$$

where  $w_A$  and  $w_B$  are the mass fractions of the monomers A and B, and  $T_{gA}$  and  $T_{gB}$  are the absolute glass transition temperatures of the corresponding homopolymers ( $T_{gA} < T_{gB}$ ). The constant  $c$  takes into account the expansion coefficients of the melt and glass state of the two homopolymers. Its value is generally between 0.5 and 2.0.

Thus, the glass transition temperature of the polymer can be calculated based on the amounts and types of monomers selected, where "Tg" values of the homopolymers of the monomers are known constants. While the Tg of an emulsion resin will be somewhat affected by the choice of colloid, the polymer composition predominantly influences Tg, and a skilled artisan would be able to manufacture a polymer within the claimed Tg range without undue experimentation. *See, Declaration* at paragraph 10.

Finally, regarding § 112 enablement issues, the Examiner briefly stated in the final rejection that the application is "not enabled for producing the polymer component having specific dispersibility properties." *See*, January 10, 2007 Office Action at section 2. The Examiner refers back to the September 2006 rejection which states:

6. The claims recite an emulsion binder comprising a polymer. The claims require certain properties: The emulsion binder has specific dispersibility properties; the polymer has a Tg within the claimed range. The specification teaches various monomers suited for making said polymer. However, the specification is not adequately enabled for producing the polymer component having the required properties, because not all of the monomer combinations that fall within the scope of the claims necessarily result in a polymer having the claimed properties.

The reasoning outlined above was specifically rejected in *In re Goffe* which considered an enablement rejection sustained by the Board apparently because the claims were inclusive of materials which may be inoperative in the invention as claimed. In *Goffe*, the Court reversed the §112, first paragraph enablement rejections noting that:

[W]e cannot agree with the board's determination that the claims are inclusive of materials which would not apparently be operative in the claimed process. \*\*\* Having stated the objective \*\*\* together with the process steps, use of materials which might prevent achievement of the objective \*\*\* can hardly be said to be within the scope of the claims.

Id. At 431 (citing *In re Geerdes*, 180 USPQ 789, 793 (CCPA 1974)).

Accordingly, the enablement rejection does not comport with applicable law in this regard, and should be withdrawn. In any event, the enablement issues were addressed in detail in the October 24, 2006 *Declaration of Steven P. Pauls, Sr.* See, for example, paragraphs 9 and 11 of that *Declaration*, where it is noted that numerous working examples are disclosed which meet the recited dispersibility properties, and that the choice of monomer components to make the salt-sensitive polymer would be a matter of routine, or at least not require a great deal of experimentation.

All claims should be allowed, for the reasons discussed above.

Please charge any applicable fees for additional claims to our Deposit Account no. 50-0935. This response is believed timely filed. However, if any additional extensions are required, please consider this paper a *Petition* thereof and charge our Deposit Account No. 50-0935.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Aaron Webb', with a long horizontal flourish extending to the right.

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